

What is claimed is:

1. An air purification system comprising:

a housing having a catalytic titanium element and an irradiation chamber;

an air circulator for exposing air to the titanium element and for passing air

through the irradiation chamber, and

an ultraviolet radiation generator comprising at least one radiation source, the generator mounted in the irradiation chamber for irradiating the air passing through the irradiation chamber.

2. The air purification system of claim 1 further comprising:

a power controller capable of communication with an AC power source, comprising:

a pollution detector; and

a system activator for selectively powering the at least one radiation source in response to a pollutant indicator signal received from the detector.

3. The air purification system of claim 2, wherein the pollutant detector is capable of detecting the presence of a pollutant selected from the group consisting of carbon monoxide, carbon dioxide, benzene, methane, formaldehyde, sulfur dioxide, oxygen, hydrogen, hydrogen sulfide, NO<sub>x</sub>, ozone and aerosols.

4. The air purification system of claim 2, further comprising:

a timer associated with the power controller for determining a selected time during which power is supplied to the at least one radiation source.

5. The air purification system of claim 1, further comprising:

a heater mounted within the housing for providing heat to an external environment.

6. The air purification system of claim 1, further comprising:

a cooling unit mounted within the housing for cooling an external environment.

7. The air purification system of claim 1, further comprising:

a filter mounted within the housing for filtering the air passing therethrough.

5 8. The air purification system of claim 1, wherein the housing is adapted for insertion in a duct of an HVAC unit.

9. The air purification system of claim 1, wherein the generator comprises a plurality of radiation sources, each source configured to provide a different spectrum of radiation from that provided by another source, the housing further comprising:

10 at least one titanium isolator configured to optically isolate distinct regions of the irradiating chamber, so that air can be exposed to a particular spectrum while passing through a particular region.

10. The air purification system of claim 9, wherein the at least one isolator has a surface, upon which air may pass, that contains titanium.

11. The air purification system of claim 10, wherein a first radiation source is capable of generating radiation within a first wavelength band of ozone-producing radiation and a second radiation source is capable of generating radiation within a second wavelength band of germicidal radiation.

12. The air purification system of claim 1, wherein the catalytic titanium element is located adjacent to the ultraviolet radiation generator.

13. A method for purifying air comprising:

circulating impure air through a chamber having a titanium element therein;

25 and

exposing the air to ultraviolet radiation while the air circulates through the chamber, thereby inducing a photocatalytic reaction causing a reduction in pollutant level in the air.

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